A Novel Spectrophotometric Method for Determination of Chloramphenicol Based On Diazotization Reaction at Room Temperature

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ABSTRACT

An analytical method for determination of chloramphenicol (CAP) based on the diazotization reaction at room temperature has been developed. The CAP was reduced using zinc powder (Zn) and diazotization reaction was carried out at room temperature in the presence of $NaNO_2$, bismuth nitrate pentahydrate ($Bi(NO_3)_3.5H_2O$) as catalyst. 2-napthol was used as coupling agent to form a red-violet solution and the absorbance was measured by UV-Vis spectrophotometer at 554 nm. The optimization of analytical parameters including reducing agent, catalyst, coupling agent and time response were 0.15 g, 0.15 g, 230.67 µg/mL and 8-9 min respectively.

Keywords: *azo dye; chloramphenicol; diazotization reaction; spectrophotometry*

ABSTRAK

Sebuah metode analitik telah dikembangkan untuk penentuan kloramfenikol (CAP) berdasarkan reaksi diazotasi pada suhu kamar. CAP direduksi dengan menggunakan serbuk seng (Zn) dan reaksi diazotasi dilakukan pada suhu ruang dengan mereaksikan $NaNO_2$, bismut (III) nitrat pentahidrat ($Bi(NO_3)_3.5H_2O$) sebagai katalis. 2-naftol digunakan sebagai agen pengkopling untuk membentuk senyawa azo yang berwarna merah-ungu dan absorbansi diukur dengan spektrofotometer UV-Vis pada panjang gelombang 554 nm. Optimasi parameter analitik diantaranya agen pereduksi, katalis, agen pengkopling dan waktu respon masing-masing 0,15 g, 0,15 g, 230,67 µg/mL dan 8-9 menit.

Kata Kunci: *senyawa azo; kloramfenikol; reaksi diazotasi; spektrofotometri*

INTRODUCTION

Chloramphenicol (CAP), is an antibiotic drug. It is broad spectrum antibiotic, isolated from *streptomyces venenzuelae*. Chloramphenicol is effective against a wide variety of Gram-positive and Gram-negative bacteria, including most anaerobic organisms. It is widely used because it is inexpensive and readily available. The most serious adverse effect associated with CAP treatment is bone marrow toxicity, which may occur in two distinct forms: bone marrow suppression, which is a direct toxic effect of the drug and is usually reversible, and aplastic anemia, which is idiosyncratic (rare, unpredictable, and unrelated to dose) and generally fatal [1-3]. European Commission, the United States and some other countries have strictly banned the use of CAP in drug and food product as in eggs, honey, milk and shrimp [4]. The chemical structure of CAP was shown in Fig. 1.

Several analytical methods have been developed for the analysis and determination of CAP, including Chemiluminescence [5], Capillary Zone Electrophoresis [6], Piezoelectric Immunosensor [7], Liquid Chromatography [8], Liquid Chromatography–Mass Spectrometry (LC-MS) [9, 10], Enzyme-Linked Immunosorbent Assay (ELISA) [11], High Performance Liquid Chromatography (HPLC) [12], and Spectrophotometry [13]. In the present work, an analytical protocol for determination of CAP based on diazotization reaction. UV-Vis spectrophotometer was established. The coupling reaction occurred at room temperature in the presence of $Bi(NO_3)_3.5H_2O$ as

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